

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	41	haldorsen.in.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/05/19 07:32
L3	12	(haldorsen near jak\$).in.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/05/19 07:30
L4	3048	(filter or filtering) same (attenuate with (noise or interference or borehole adj1 borne))	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/05/19 08:24
L5	6	("5555530" "5971095" "6446008").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/05/19 08:09
L6	153700	(migrating or migration or ('time' adj1 correction))	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/05/19 08:10
L7	36882	beamforming or beamformer or beam adj1 (forming or former or form) or beamform	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/05/19 08:11
L8	4	4 and 6 and 7	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/05/19 08:13
L9	1567	367/25.ccls. or 367/34.ccls. or 367/38.ccls. or 367/43.ccls. or 367/50.ccls. or 702/6.ccls. or 702/17.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/05/19 08:18
L10	27527	(filter or filtering) same ((attenuate or eliminate or reduce) with (noise or interference or borehole adj1 borne))	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/05/19 08:24
L11	104	9 and 10	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/05/19 08:29
L12	11225	(location or position) near3 (reflector\$1)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/05/19 08:29
L13	10	11 and 12	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/05/19 08:33

L14	1043	367/25-35.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/05/19 08:33
L15	14	11 and 14	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/05/19 09:05
L16	81	9 and 12	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/05/19 09:05

**Current session 19/05/2005**

(C) QUESTEL 1994

QUESTEL.ORBIT (TM) 1998

Last connection: 05/05/05 17\*58\*24

19/05/05 14\*40\*09

WELCOME to QUESTEL.ORBIT- Your Guide to INTELLECTUAL PROPERTY  
www.questel.orbit.com - Gateway, documentation & IP resource  
- Times of operation of Questel.Orbit service, see INFO HOURS  
- Enhanced SDI Email Delivery with Links to Download Results  
- New Export Feature: improved offline options - INFO EXPORT  
- PatentExaminer portfolio manager available - INFO PATEXAM  
- 2005 Euro and US Dollar price lists available from website  
- Research Disclosure file now available - enter: INFO RDISC  
- \*FAMPAT worldwide family file released. Details on website  
..FILE / ..INFO / ..GUIDE

? ..subacct migration

Now charging Subaccount MIGRATION

..FILE / ..INFO / ..GUIDE

**Query/Command : file tulsa, georef**

ER 6

GEOREF

You have typed an incorrect word : please check your input  
..FILE / ..INFO / ..GUIDE

**Query/Command : file tulsa**

Subaccount MIGRATION

QUESTEL - Time in minutes : 0,36

The cost estimation below is based on Questel's  
standard price list

Estimated cost : 0.38 USD

Cost estimated for the last database search : 0.38 USD

Estimated total session cost : 0.38 USD

Main Account

QUESTEL - Time in minutes : 0,51

The cost estimation below is based on Questel's  
standard price list

Estimated cost : 0.55 USD

Cost estimated for the last database search : 0.55 USD

Estimated total session cost : 0.55 USD

Selected file: TULSA

YOU ARE NOW CONNECTED TO TULSA

h eb e e f e e e e e e e b h h

COVERS 1965 THRU WEEKLY UPDATE 2005-20  
For further information, type ..INFO TULSA.  
COPYRIGHT(C) 2000 University of Tulsa

Search statement 1

**Query/Command : migration or migrating**

Frequency Term  
27569 MIGRATION  
1227 MIGRATING

**\*\* SS 1: Results 28.138**

Search statement 2

**Query/Command : filter or filtering**

Frequency Term  
12545 FILTER  
6732 FILTERING

**\*\* SS 2: Results 15.750**

Search statement 3

**Query/Command : beamformer or beamforming**

Frequency Term  
13 BEAMFORMER  
43 BEAMFORMING

**\*\* SS 3: Results 48**

Search statement 4

**Query/Command : 1 and 2 and 3**

h eb e e f e e e e e b h h

**\*\* SS 4: Results 1**

Search statement 5

**Query/Command : PRT SS 4 MAX 1**

---

*1/1 TULSA - ©TULS***Accession Number :**

802253

**Title :**

MULTIPLE ATTENUATION USING BEAMFORMING ONSHORE AND OFFSHORE CHINA

**Author :**

HU, T; HONG, F; WANG, R; LI, G; WEN, S

**Organiz. Source :**

PEKING UNIV; PETROLEUM UNIV, BEIJING; CHINA NATIONAL PETROL CORP; CHINA NAT OFFSHOR OIL CORP

**Source :**

LEADING EDGE V 21, NO 9, PP 906-910, SEPT 2002

**Numbers :**

ISSN 1070485X

**Language :**

ENGLISH; (ENG)

**Index Terms :**

CHINA\*; ASIA\*; ATTENUATION\*; EURASIA\*; GEOLOGIC STRUCTURE\*; IMAGING\*; MULTIPLE REFLECTION\*; NOISE REDUCTION\*; REFLECTION (SEISMIC)\*; SEISMIC WAVE PROPAGATION\*; WAVE ATTENUATION\*; WAVE PHENOMENON\*; WAVE PROPAGATION\*; ADMINISTRATION; AMPLITUDE; ANALYTICAL METHOD; AZIMUTH; BUSINESS OPERATION; CALCULATING; COHERENT NOISE; COMMON DEPTH POINT METHOD; COMMON REFLECTION POINT; COMPUTING TIME; COST CONTROL; DAGANG OIL FIELD; DATA PROCESSING; DIP; DIP MOVEOUT; ELASTIC WAVE; ELECTRICAL EQUIPMENT; ELECTRONIC EQUIPMENT; EXPLORATION; FAULT (GEOLOGY); FILTERING (ELECTRICAL); FORWARD MODEL; FREQUENCY; GEOPHYSICAL EXPLORATION; INSTRUMENT; LAND; LOW FREQUENCY; MAN MADE NOISE; MANAGEMENT; MARINE EXPLORATION; MATHEMATICS; MIGRATION; MIGRATION (SEISMIC); MODEL; MOVEOUT; MULTIPLE CHANNEL RECORDER; MULTITRACE ANALYSIS; NOISE; NORMAL MOVEOUT; NORTH PACIFIC OCEAN; OFFSET; OFFSHORE; PACIFIC OCEAN; PHYSICAL PROPERTY; PRIMARY REFLECTION; RANDOM NOISE; RECEIVER (ELECTRONIC); RECORDER; REEF; REVERBERATION; SEAS AND OCEANS; SEISMIC DATA PROCESSING; SEISMIC EXPLORATION; SEISMIC NOISE; SEISMIC REFLECTION METHOD; SEISMIC VELOCITY; SEISMIC VELOCITY COMPUTATN; SEISMIC WAVE; SOUTH CHINA SEA; SPATIAL FREQUENCY; STACKING (SEISMIC); TESTING; THIN BED MULTIPLE REFLECTN; THRUST FAULT; TIME; TRACE

ANALYSIS (ELECTRIC); TRAVEL TIME; TWO DIMENSIONAL SEISMIC; VELOCITY; WAVE; WAVE AMPLITUDE; WAVE FREQUENCY; WAVE PROPERTY; WAVE VELOCITY; WAVEFORM

**Main Heading :**

CHINA\*

**Category Codes :**

GEOPHYSICS

**Abstract :**

Strong multiples generated by a coral reef can be identified from a 2D, 4-s common offset section recorded in the offshore South China Sea. In order to reject these multiples with reasonable computation effort, **beamforming** multiple attenuation was applied by using overlap reject bands. The offshore results show that this method can attenuate some very strong multiples and enhance weak primaries. Multiple attenuation, a long-standing challenge in seismic processing, is particularly difficult in areas of complex geology.

**Beamforming** has been developed especially to handle cases in which preserving amplitude and/or top muted prestack data is important. Minimum variance unbiased (MVU) **beamforming** is a multichannel **filter** which extracts seismic reflection signals without distortion, while minimizing residual noise power. The key concept behind **beamforming** multiple attenuation is to separate primaries and multiples in terms of the difference of their moveout. For the purpose of better describing primaries and multiples recorded in deep 3D data, the normal moveout curves of primaries and multiples are updated by four parameters: two-way traveltimes at zero offset, velocity, dip angle, and azimuth.

**Publication Year :**

2002

Search statement 5

**Query/Command : his**

File : TULSA

SS Results

1	28138	MIGRATION OR MIGRATING
2	15750	FILTER OR FILTERING
3	48	BEAMFORMER OR BEAMFORMING
4	1	1 AND 2 AND 3

Search statement 5

**Query/Command : borehole**

**\*\* SS 5: Results 37.735**

Search statement 6

h eb e e f e e e e e e b h h

**Query/Command : his**

File : TULSA

SS Results

1	28138	MIGRATION OR MIGRATING
2	15750	FILTER OR FILTERING
3	48	BEAMFORMER OR BEAMFORMING
4	1	1 AND 2 AND 3
5	37735	BOREHOLE

Search statement 6

**Query/Command : 1 and 3 and 5**

\*\* SS 6: Results 0

Search statement 7

**Query/Command : his**

File : TULSA

SS Results

1	28138	MIGRATION OR MIGRATING
2	15750	FILTER OR FILTERING
3	48	BEAMFORMER OR BEAMFORMING
4	1	1 AND 2 AND 3
5	37735	BOREHOLE
6	0	1 AND 3 AND 5

Search statement 7

**Query/Command : beamforming or beamforming or beamsteering or beamsteer**

Frequency Term

43	BEAMFORMING
43	BEAMFORMING
1	BEAMSTEERING
0	BEAMSTEER

\*\* SS 7: Results 44

Search statement 8

**Query/Command : beamforming or beamformer or beam w/1 steering**

h eb e e f e e e e e b h h

Frequency	Term
43	BEAMFORMING
13	BEAMFORMER
3436	BEAM
3603	STEERING

**\*\* SS 8: Results 69**

Search statement 9

**Query/Command : his**

File : TULSA

**SS Results**

1	28138	MIGRATION OR MIGRATING
2	15750	FILTER OR FILTERING
3	48	BEAMFORMER OR BEAMFORMING
4	1	1 AND 2 AND 3
5	37735	BOREHOLE
6	0	1 AND 3 AND 5
7	44	BEAMFORMING OR BEAMFORMING OR BEAMSTEERING OR BEAMSTEER
8	69	BEAMFORMING OR BEAMFORMER OR BEAM W/1 STEERING

Search statement 9

**Query/Command : 5 and 8****\*\* SS 9: Results 2**

Search statement 10

**Query/Command : PRT SS 9 MAX 1**

---

1/2 TULSA - ©TULS**Accession Number :**

617652

**Title :**AN ACOUSTIC SONDE TRANSDUCER ARRAY AND METHODS OF BEAM  
STEERING AND FOCUSING**Author :**

SCHMIDT, M G; PRIEST, J F

h eb e e f e e e e e b h h

**Organiz. Source :**

WESTERN ATLAS INTERNAT INC

**Source :**

GR BRIT 2,287,789A, P 95.09.27, F 95.03.22, PR US 94.03.22 (APPL 216,648) (G01V-001/40; B06B-001/06) (66 PP; 56 CLAIMS)

**Language :**

ENGLISH; (ENG)

**Document Type :**

(P) PATENT

**Patent Number :**

GB2287789 A

**Patent Date :**

1995-09-27

**Application Info. :**

19950322

**Priority Info. :**

US 216,648 19940322 [1994US-0216648]

**International Classif. :**

G01V-001/40; B06B-001/06

**Index Terms :**

ELECTROACOUSTIC TRANSDUCER\*; ELASTIC WAVE LOGGING\*; FOCUSING\*; INSTRUMENT\*; PIEZOELECTRIC TRANSDUCER\*; SONDE\*; SONIC LOGGING\*; SOUND WAVE SOURCE\*; TRANSDUCER\*; WAVE FOCUSING\*; WAVE SOURCE\*; WELL LOGGING\*; ABSORPTION; ACOUSTIC RECEIVER; ACOUSTICS; ARRAY; ATTENUATION; BLOCK DIAGRAM; BOREHOLE IMAGING; CARBON; CASINGS; CEMENT BOND LOGGING; CHART; CIRCUIT; COEFFICIENT; COMPARTMENT; COMPOSITE MATERIAL; CONSTRUCTION MATERIAL; DAMPER; DAMPING; DETECTION; DETECTOR; DIAGRAM; DIP LOGGING; ELASTIC WAVE; ELECTRIC CIRCUIT; ELECTRICAL EQUIPMENT; ELECTRONIC EQUIPMENT; ELECTRONICS; ELEMENT (CHEMICAL); ENGINEERING DRAWING; EQUALIZING; EQUIPMENT LAYOUT; FORMATION EVALUATION; GROUP IVA; IMAGING; INTENSITY; INTERPRETATION; LOGGING THROUGH CASING; LOGGING WHILE DRILLING; MATHEMATICS; MECHANICAL PROPERTY; MECHANICAL STRENGTH; MOUNTING; MULTIPLE; NOISE REDUCTION; PATTERN; PHYSICAL PROPERTY; RECEIVER (ELECTRONIC); REMOTE SENSING; REMOTE SENSOR; SORPTION; SOUND WAVE; SPACING; SUBSURFACE; THERMAL EXPANSION; THERMAL PROPERTY; ULTRASONIC WAVE; ULTRASONICS; WAVE; WAVE ABSORPTION; WAVE ATTENUATION; WAVE INTENSITY; WAVE PHENOMENON; WAVE PROPAGATION; WELL LOGGING EQUIPMENT; WESTERN ATLAS INTERNAT INC; WINDOW

**Main Heading :**

ELECTROACOUSTIC TRANSDUCER\*

**Category Codes :**

WELL LOGGING &amp; SURVEYING

### **Abstract :**

An acoustic transducer array for a sonde and methods of **beam steering** and focusing are described. The transducer array comprises an annular array of piezoelectric elements on an acoustic attenuating backing which employs the selective use of mechanical and electronic beam focusing, electronic **beam steering** and amplitude shading to increase resolution and overcome side lobe effects. A signal reconstruction technique utilizes independent array element transmission and reception, creating focusing and **beam steering**. The configuration of the transducer array is preferably cylindrical, but may be conical, biconical, convex, concave or may take the form of a number of other suitable geometric configurations. The transducer array may incorporate a transformer block having an array of multiple transformers therein for connection to individual transducer circuits. The transformers may be fixed or may be capable of being mechanically tuned as desired.

### Publication Year :

1995

### Search statement 10

Query/Command : his

File : TULSA

## SS Results

1 28138 MIGRATION OR MIGRATING  
2 15750 FILTER OR FILTERING  
3 48 BEAMFORMER OR BEAMFORMING  
4 1 1 AND 2 AND 3  
5 37735 BOREHOLE  
6 0 1 AND 3 AND 5  
7 44 BEAMFORMING OR BEAMFORMING OR BEAMSTEERING OR BEAMSTEER  
8 69 BEAMFORMING OR BEAMFORMER OR BEAM W/1 STEERING  
9 2 5 AND 8

### Search statement 10

Query/Command : **prt ss 9 2 ti so ab**

2 / 2 TULSA - ©TULS

**TI** - POROSITY, PERMEABILITY AND SHEAR STRENGTH (P\*2S) CROSS-WELL TOMOGRAPHY EXPERIMENTS OF A NOISY FOUNDATION

**SO** - 2ND SOC EXPLOR GEOPHYS JAPAN ET AL GEOTOMOGRAPHY INT SYMP (TOKYO, JAPAN, 92.11.18-19) PROC V 2, PP 401-416, NOV 1992 (ISBN 4-938493-01-2; 10 REFS)

**AB** - EXPERIMENT AND ANALYSIS OF CROSS-WELL TOMOGRAPHY OF A SEDIMENTARY FOUNDATION WITH VERY HIGH BACKGROUND NOISE AT AN IRON FOUNDRY ARE PERFORMED. HIGH RESOLUTION VELOCITY IMAGES BETWEEN WELLS SEPARATED BY LONG DISTANCES (UP TO 250 M) HAVE BEEN OBTAINED USING LONG SEQUENCES (UP TO 4,095 CYCLES) OF PSEUDO-RANDOM BINARY CODES AT HIGH CARRIER FREQUENCIES (ONE TO 10 KHZ) TO EXCITE

A PIEZOELECTRIC SOURCE IN A WATER-FILLED WELL. TRANSMITTED SIGNALS ARE RECEIVED BY A 24-CHANNEL HYDROPHONE ARRAY IN ANOTHER WELL. **BEAMFORMING** PERFORMED ON COMMON SOURCE GATHER DATA IDENTIFIES THE DIRECTIONS AND ARRIVAL TIMES OF MULTIPLE RAY PATHS AND TUBE WAVES, AND FURTHER ENHANCES THE SIGNAL-TO- NOISE RATIO. USING THE FIRST ARRIVAL DATA TRAVEL TIME INVERSION IS PERFORMED TO OBTAIN THE COMPRESSIONAL WAVE VELOCITY IMAGE USING THE DAMPED LEAST SQUARES METHOD AND RAY TRACING ALGORITHM. ASSUMING THE NORMAL CONSOLIDATION CONDITION, THE POROSITY AND SHEAR STRENGTH IMAGES ARE TRANSFORMED FROM THE COMPRESSIONAL WAVE VELOCITY IMAGE. THE SLIGHT DIFFERENCES IN THE COMPRESSIONAL WAVE VELOCITY IMAGES OBTAINED USING DIFFERENT CARRIER FREQUENCIES CAN BE USED TO DETERMINE THE PERMEABILITY IMAGE OF SEDIMENTS BASED ON THE BIOT THEORY.

Search statement 10

**Query/Command : (position or location) (4d) (reflector or interface)**

Frequency	Term
16114	POSITION
21037	LOCATION
2419	REFLECTOR
17914	INTERFACE

**\*\* SS 10: Results 174**

Search statement 11

**Query/Command : his**

File : TULSA

SS	Results
1	28138 MIGRATION OR MIGRATING
2	15750 FILTER OR FILTERING
3	48 BEAMFORMER OR BEAMFORMING
4	1 1 AND 2 AND 3
5	37735 BOREHOLE
6	0 1 AND 3 AND 5
7	44 BEAMFORMING OR BEAMFORMING OR BEAMSTEERING OR BEAMSTEER
8	69 BEAMFORMING OR BEAMFORMER OR BEAM W/1 STEERING
9	2 5 AND 8
10	174 (POSITION OR LOCATION) (4D) (REFLECTOR OR INTERFACE)

Search statement 11

h eb e e f e e e e e e b h h

**Query/Command : 8 and 10**

\*\* SS 11: Results 0

Search statement 12

**Query/Command : his**

File : TULSA

SS Results

1	28138	MIGRATION OR MIGRATING
2	15750	FILTER OR FILTERING
3	48	BEAMFORMER OR BEAMFORMING
4	1	1 AND 2 AND 3
5	37735	BOREHOLE
6	0	1 AND 3 AND 5
7	44	BEAMFORMING OR BEAMFORMING OR BEAMSTEERING OR BEAMSTEER
8	69	BEAMFORMING OR BEAMFORMER OR BEAM W/1 STEERING
9	2	5 AND 8
10	174	(POSITION OR LOCATION) (4D) (REFLECTOR OR INTERFACE)
11	0	8 AND 10

Search statement 12

**Query/Command : triangulation and 10**

Frequency Term

272 TRIANGULATION

\*\* SS 12: Results 0

Search statement 13

**Query/Command : his**

File : TULSA

SS Results

1	28138	MIGRATION OR MIGRATING
2	15750	FILTER OR FILTERING
3	48	BEAMFORMER OR BEAMFORMING
4	1	1 AND 2 AND 3
5	37735	BOREHOLE
6	0	1 AND 3 AND 5
7	44	BEAMFORMING OR BEAMFORMING OR BEAMSTEERING OR BEAMSTEER
8	69	BEAMFORMING OR BEAMFORMER OR BEAM W/1 STEERING

9            2 5 AND 8  
10           174 (POSITION OR LOCATION) (4D) (REFLECTOR OR INTERFACE)  
11           0 8 AND 10  
12           0 TRIANGULATION AND 10

Search statement 13

Query/Command : (1 or 2) and 10

\*\* SS 13: Results 36

Search statement 14

Query/Command : 1 and 2 and 10

\*\* SS 14: Results 1

Search statement 15

Query/Command : prt ss 14 fu

---

1/1 TULSA - ©TULS

AN - 555316  
TI - HYDROCARBON DETECTION WITH AVO (AMPLITUDE VERSUS  
OFFSET)  
AU - CHIBURIS, E; LEANEY, S; SKIDMORE, C; FRANCK, C; MCHUGO, S  
OS - EC GEO; AMOCO PRODUCTION CO; ROYAL OIL & GAS CORP  
SO - OILFIELD REV V 5, NO 1, PP 42-50, JAN 1993 (6 REFS)  
NU - ISSN 09231730  
LA - ENGLISH; (ENG)  
IT - AMPLITUDE VERSUS OFFSET\*; DATA PROCESSING\*; DIRECT  
HYDROCARBON INDICTR\*; EXPLORATION\*; GEOLOGY\*;  
GEOPHYSICAL EXPLORATION\*; INTERVAL VELOCITY\*; REFLECTION  
(SEISMIC)\*; SEISMIC DATA PROCESSING\*; SEISMIC EXPLORATION\*;  
SEISMIC REFLECTION METHOD\*; SEISMIC STRATIGRAPHY\*; SEISMIC  
VELOCITY\*; SEISMIC WAVE PROPAGATION\*; STRATIGRAPHY\*;  
VELOCITY\*; WAVE PHENOMENON\*; WAVE PROPAGATION\*; WAVE  
VELOCITY\*; AMPLITUDE; ANALYTICAL METHOD; ASIA; BRIGHT  
SPOT TECHNOLOGY; CHART; COMPARISON; COMPRESSATIONAL WAVE  
VELOCIT; DATA; DECONVOLUTION; DENSITY; ELECTRICAL  
EQUIPMENT; ELECTRONIC EQUIPMENT; EQUATION; EURASIA;

FILTER (ELECTRICAL); GEOPHYSICAL DATA; GRAPH;  
 HYDROCARBON POTENTIAL; KNOTT ZOEPPRITZ EQUATION;  
 MATHEMATICAL ANALYSIS; MATHEMATICS; MIGRATION;  
 MIGRATION (SEISMIC); MULTIPLE REFLECTION; NUMERICAL  
 INVERSION; OFFSET; PHYSICAL PROPERTY; PULSE; RECORD;  
 REFLECTION COEFFICIENT; REFLECTION RECORD; ROCK DENSITY;  
 SATURATION; SATURATION (ROCK); SAUDI ARABIA; SEISMIC DATA;  
 SEISMIC PULSE; SEISMIC RECORD; SHEAR WAVE VELOCITY;  
 SYNTHETIC SEISMOGRAM; TESTING; THREE DIMENSIONAL; TRACE  
 ANALYSIS (ELECTRIC); VELOCITY CONTRAST; VELOCITY FILTER;  
 WAVE AMPLITUDE

**MH** - AMPLITUDE VERSUS OFFSET\*

**CC** - GEOPHYSICS

**AB** - ADVANCES IN DATA ACQUISITION, PROCESSING AND  
 INTERPRETATION NOW MAKE IT POSSIBLE TO USE SEISMIC TRACES  
 TO REVEAL MORE THAN JUST **REFLECTOR SHAPE AND POSITION**.  
 CHANGES IN THE CHARACTER OF SEISMIC PULSES RETURNING  
 FROM A REFLECTOR CAN BE INTERPRETED TO ASCERTAIN THE  
 DEPOSITIONAL HISTORY OF A BASIN, THE ROCK TYPE IN A LAYER,  
 AND EVEN THE NATURE OF THE PORE FLUID. THIS LAST  
 REFINEMENT, PORE FLUID IDENTIFICATION, IS THE ULTIMATE  
 GOAL OF AVO ANALYSIS. A GENERAL OVERVIEW OF THE  
 PROCESSING REQUIREMENTS AND CAPABILITIES OF THE AVO  
 PROCESS IS GIVEN. INTERPRETATION EXAMPLES USING REAL DATA  
 ARE PRESENTED.

**PY** - 1993

Search statement 15

Query/Command : his

File : TULSA

SS Results

1	28138	MIGRATION OR MIGRATING
2	15750	FILTER OR FILTERING
3	48	BEAMFORMER OR BEAMFORMING
4	1	1 AND 2 AND 3
5	37735	BOREHOLE
6	0	1 AND 3 AND 5
7	44	BEAMFORMING OR BEAMFORMING OR BEAMSTEERING OR BEAMSTEER
8	69	BEAMFORMING OR BEAMFORMER OR BEAM W/1 STEERING
9	2	5 AND 8
10	174	(POSITION OR LOCATION) (4D) (REFLECTOR OR INTERFACE)
11	0	8 AND 10
12	0	TRIANGULATION AND 10
13	36	( 1 OR 2) AND 10
14	1	1 AND 2 AND 10

Search statement 15

h eb e e f e e e e e b h h

## Query/Command : 5 and 10

## \*\* SS 15: Results 15

Search statement 16

## Query/Command : prt ss 15 1-15 ti so ab

---

1/15 TULSA - ©TULS

**TI** - SLOPE TRANSMISSION TOMOGRAPHY FOR BOREHOLE POSITIONING

**SO** - 74TH ANNU SEG INT MTG (DENVER, CO, 2004.10.10-15) EXPANDED ABSTR BIOGR V 2, PP 2331-2334, 2004 (PAP NO TOM 1-3; ALSO AVAILABLE ON CD-ROM; 5 REFS)

**AB** - One of the main interests of surface to **borehole** tomography is to reduce the depth-velocity trade off generally encountered in traditional surface seismic inversion. Indeed, direct arrivals recorded in the well can introduce in the process a time-to-depth relation, allowing better **reflector** depth **location** in the **borehole** vicinity. This precious information is reliable only if the well positioning is accurate enough, which is commonly assumed. Such an assumption can be erroneous in some cases and may lead to distortions in tomograms. Tomography must then invert both velocity field and **borehole** location to provide correct results. A traveltime and slope tomography method is presented allowing joint recovery of both the velocity model and the **borehole** location from surface to **borehole** acquisition geometry. A dedicated application of the slope transmission tomography on a synthetic walk-away data set is proposed, in addition to some criteria in order to assess the quality of the resulting **borehole** location. (Longer abstract available)

---

2/15 TULSA - ©TULS

**TI** - METHOD AND DEVICE FOR DETERMINING THE POSITION OF AN INTERFACE IN RELATION TO A BORE HOLE

**SO** - WORLD 04/038,177A1, P 2004.05.06, F 2003.10.06, PR FR 2002.10.25 (APPL 0,213,370) (E21B-047/04; G01V-003/30) (35 PP; 23 CLAIMS)

**AB** - A method is described for determining the position, in a formation containing at least one electrolytic liquid, of an interface in relation to a **borehole**. At a first instant, the interface is stimulated with an excitation signal. At a second instant, a response signal is detected, converted by electro-osmosis or electrokinetic coupling effect. If appropriate, the excitation signal is detected after reflection at a third instant. With the three instants and the propagation velocity of the signals, the distance between the interface and the **borehole** is calculated.

---

3/15 TULSA - ©TULS

**TI** - SLICKLINE FLUID IDENTIFICATION TOOL

h eb e e f e e e e e b h h

**SO** - GR BRIT 2,359,396A, P 2001.08.22, F 2000.09.19, PR US 1999.09.24 (APPL 405,929) (E21B-047/04) (38 PP; 17 CLAIMS)

**AB** - The technology relates to electronic well logging, more particularly to a method and apparatus for identifying a fluid in a wellbore, using a slickline logging instrument. A down hole slickline tool and system for identifying fluid in a wellbore comprises (1) a fluid sensing component for sensing at least one fluid property and transmitting a data signal containing information describing the sensed property; (2) an electronic circuit for receiving the data signal and transmitting a control signal based on the data signal; and (3) a magnet drag component for receiving the control signal and activating an electromagnet based on the control signal. The sensing component may detect fluid interfaces by resistance, capacitance inductance, acoustics, radiation, pressure, magnetic, electric, or electromagnetic field. The operation of the drag component enables a surface sensor monitoring tension in the slickline to mark the **position** of the **interface** on a trace associated with downhole depth measurement, e.g., by sensing of the line movement downhole and uphole.

---

4/15 TULSA - ©TULS

**TI** - OBTAINING AN IMAGE OF AN UNDERGROUND FORMATION

**SO** - WORLD 01/27,657A1, P 2001.04.19, F 2000.10.12, PR EUROPE 1999.10.14 (APPL 99,308,119) (G01V-001/50) (15 PP; 5 CLAIMS)

**AB** - An image of an underground formation around a **borehole** is obtained by activating an omnidirectional source and recording with a three-component receiver the components of the reflected energy; determining from the components the directions from which the energy arrives at the three-component receiver as a function of two-way travel time; selecting a first underground **position**; assuming a **reflector** to be present at position and calculating the arrival direction of a ray extending from the source via the reflector to the receiver and two-way travel time along the ray; accepting the data if the calculated arrival direction is substantially equal to an arrival direction that has the same two-way travel time and attributing the data on the position; and selecting a next position and repeating steps until the last underground position to obtain the image of the underground formation comprising a set of reflectors attributed to positions.

---

5/15 TULSA - ©TULS

**TI** - CONTROLLING CONING BY SENSING A FORMATION FLUID INTERFACE

**SO** - GR BRIT 2,355,477A, P 2001.04.25, F 2000.09.20, PR US 1999.09.28 (APPL 407,597) (E21B-049/00) (35 PP; 25 CLAIMS)

**AB** - A method of detecting a fluid interface in a formation involves drilling a number of micro-boreholes away from the main production **borehole** close to the zone containing the interface. Detectors are permanently implanted in the micro-boreholes. By using transmitters in the production **borehole** or micro-boreholes, signals are sent into the formation that are responsive to the **position** of the **interface**. Processing of the detected signals facilitates monitoring of the **location** of the **interface**, which monitoring allows operation of flow control devices to avoid coning or breakthrough of undesirable fluid into the **borehole**. The

transmitters may be deployed outside the casing in the production well or deployed on a wireline. The transmitters and detectors can consist of either seismic or electromagnetic sources and detectors, and the interface may be a boundary between oil and gas, a boundary between oil and water, a boundary between gas and water, or a boundary between steam and oil.

---

6/15 TULSA - ©TULS

**TI** - METHOD AND SYSTEM FOR DETERMINING THE AZIMUTH POSITION AND DISTANCE OF A REFLECTING SUBSURFACE FORMATION

**SO** - US 6,176,344B1, C 2001.01.23, F 1997.10.27 (APPL 957,889) (G01V-001/40) (8 PP; 9 CLAIMS)

**AB** - Sonic tools are described for **borehole** logging, particularly a method and system for determining the azimuth position and distance of a reflecting subsurface formation outside a **borehole**. The method and system are used for determining the azimuth **position** and distance of a **reflector** or subterranean reflecting surface of a formation bed outside a **borehole**. A monopole transmitter may be used with a monopole/dipole receiver pair, or a monopole transmitter and a dipole transmitter pair may be used with a monopole receiver to determine the azimuth **position** and distance of the **reflector**. Azimuth resolution is improved through use of multiple receiver elements at equal radius about the longitudinal axis of a **borehole** tool or through mathematical rotation of receiver elements.

---

7/15 TULSA - ©TULS

**TI** - MAGNETIC FORMATION EVALUATION BY DIRECTIONAL INDUCTION LOGGING - A MODELING STUDY

**SO** - 5TH SPWLA ET AL WELL LOGGING SYMP OF JAPAN (MAKUHARI, CHIBA, 1999.09.29-30) PROC PAP NO K, 1999 (11 PP; 11 REFS)

**AB** - A modeling study is presented to investigate an ability to evaluate magnetic properties of formations using an induction logging method. Simultaneous R- and X-response observations give complete information about electrical resistivity and magnetic susceptibility rock properties. A directional approach is described for designing the induction tool with tilted transmitting and receiving coils. The spatial resolution and ability to evaluate the formation parameters by using the proposed method are discussed. A prototype of the directional tool and experimental studies, presented earlier, have shown evident results for evaluation of electrical properties and determination of formation orientation. The method can detect the magnetic susceptibility inhomogeneity in addition to the electrical inhomogeneity by using the X-signal. The phenomenon, observed by the theoretical field distribution on X-signal log diagram, reflects the changes in magnetic properties and occurs just at the **location** of the magnetic susceptibility **interface**. Layered formation, **borehole** influence, and invaded zone effect are considered.

---

8/15 TULSA - ©TULS

**TI**

LOW YIELD OIL WELL TESTING - INVOLVES MONITORING OF RECOVERY TIME OF OIL-WATER INTERFACE TO DERIVE OIL

## COLUMN HEIGHT

SO - USSR 1,754,894-A1, P 92.08.15, F 89.09.01 (APPL 4,733,254) (E21B-047/10)  
SOVIET PAT ABSTR NO 9332, P 9-H, 93.09.29 (IN RUSSIAN; ABSTRACT  
ONLY) (AO)

AB - ENHANCED EFFICIENCY OF TESTING OF LOW-YIELD OIL WELL  
WHICH IS WATERLOGGED IS DUE TO COMBINING THE MONITORING  
OF FLUID LEVEL RECOVERY PROCESS WITH MONITORING OF THE  
POSITION OF THE OIL-WATER INTERFACE OF THE FLUID COLUMN  
IN THE WELL. THE HEIGHT OF THE OIL COLUMN IS DETERMINED,  
AND ITS MAXIMUM IS USED TO SET THE MOST EFFECTIVE  
CONDITIONS FOR INDUCING INFLOW OF THE STRATAL FLUID. THE  
ABOVE IS PRECEDED BY PRELIMINARY LOWERING OF THE FLUID  
LEVEL IN THE WELL. THE COMPUTATION OF OIL AND WATER FLOW  
RATES IS CARRIED OUT UNDER OPTIMAL CONDITIONS WITH  
DOWNHOLE FACE PRESSURE OF 4.2-5.7 MPA AT WHICH THE  
MAXIMUM AND MINIMUM FLOWS ARE OBSERVED. THESE INDICATE  
THAT THE PERMEABILITY OF THE STRATUM FOR OIL AND WATER  
VARIES. THE DIFFERENCES ARE DUE TO FILTRATION AND STORAGE  
CHARACTERSTICS OF THE COLLECTOR FOR OIL AND WATER PARTS  
OF THE STRATUM AND TO PHYSICOCHEMICAL PROPERTIES OF OIL  
AND WATER. ADVANTAGE - THE METHOD ENSURES  
DETERMINATION OF OPERATIONAL CONDITIONS OF THE WELL  
WHICH PROVIDES MAXIMUM YIELD OF OIL. (C1993 DERWENT  
PUBLICATIONS LTD.) (ORIGINAL PATENT NOT AVAILABLE FROM  
T.U.)

---

9/15 TULSA - ©TULS

TI - A STEAM-ASSISTED GRAVITY DRAINAGE MODEL FOR TAR SANDS :  
LINEAR GEOMETRY

SO - J CAN PETROL TECHNOL V 31, NO 10, PP 14-20, DEC 1992 (10 REFS)

AB - A NEW PREDICTIVE MODEL IS PRESENTED FOR GRAVITY DRAINAGE  
IN TAR SANDS DURING STEAM INJECTION IN LINEAR GEOMETRY,  
E.G., ALONG HORIZONTAL WELLS. THE MODEL HAS BEEN  
VALIDATED AGAINST PUBLISHED EXPERIMENTAL DATA. THE  
MODEL ASSUMES THAT THE STEAM ZONE SHAPE IS AN INVERTED  
TRIANGLE WITH THE LOWER VERTEX FIXED AT THE PRODUCTION  
WELL. THE TEMPERATURE PROFILE IN THE OIL IS ASSUMED TO  
DECLINE EXPONENTIALLY WITH DISTANCE AWAY FROM THE  
STEAM/OIL INTERFACE, BUT, UNLIKE PREVIOUSLY PUBLISHED  
MODELS, THE TEMPERATURE DECLINE IS INDEPENDENT OF  
POSITION ON THE INTERFACE. AN ENERGY BALANCE IS USED TO  
DETERMINE THE LATENT HEAT INJECTION RATE FOR STEAM TO  
EXPAND THE STEAM ZONE, PREHEAT THE FORMATION AHEAD OF  
THE STEAM ZONE, AND BALANCE HEAT LOSSES TO THE  
OVERBURDEN. THE ENERGY BALANCE AND OIL PRODUCTION RATE  
EQUATIONS ARE COMBINED TO YIELD THE STEAM-OIL RATIO FOR  
THIS PROCESS.

---

## 10/15 TULSA - ©TULS

**TI** - METHOD FOR IMPROVING CROSS-BOREHOLE SEISMIC SURVEYS

**SO** - GR BRIT 2,236,392A, P 91.04.03, F 90.09.10, PR GR BRIT 89.09.11 (APPL 8,920,504) (G01V-001/40) (13 PP; 9 CLAIMS)

**AB** - A METHOD IS DESCRIBED TO DETERMINE THE LOCATION OF A LAYER INTERFACE WITHIN A STRUCTURE OF SUBSURFACE FORMATION LAYERS WHICH FUNCTIONS AS A SEISMIC BOUNDARY. THE INTERFACE HAS A SUBSTANTIAL LATERAL EXTENT BETWEEN AT LEAST 2 BOREHOLES EXTENDING THROUGH THE STRUCTURE. ONE BOREHOLE IS USED FOR ARRANGING A SEISMIC GENERATOR AND THE OTHER FOR A SEISMIC RECEIVER TO DIRECTIONALLY DETECT ARRIVAL TIMES AND AMPLITUDES. THE METHOD GENERATES SEISMIC P WAVES AT LEAST AT ONE POSITION IN THE ONE BOREHOLE, AND DETECTS SEISMIC WAVES AT LEAST AT ONE POSITION AND IN 2 DIRECTIONS, THE AXIAL DIRECTION AND THE RADIAL DIRECTION WITHIN THE OTHER BOREHOLE, THEREBY OBTAINING LAYER INTERFACE RELATED STRUCTURE PARAMETERS.

## 11/15 TULSA - ©TULS

**TI** - RADAR MEASUREMENTS WITH A DIRECTIONAL BOREHOLE ANTENNA

**SO** - 59TH ANNU SOC EXPLOR GEOPHYS INT MTG (DALLAS, 89.10.29-89.11.02) EXPANDED TECH PROGRAM ABSTR BIOGR V 1, PP 222-225, 1989 (ISBN 0-931830-92-3; PAP NO E/G1 4; 5 REFS; ABSTRACT ONLY) (AO)

**AB** - A DIRECTIONAL BOREHOLE ANTENNA HAS BEEN DEVELOPED FOR THE RAMAC BOREHOLE RADAR SYSTEM. SEVERAL METHODS PREVIOUSLY USED TO LOCATE FRACTURE ZONES IN ROCK ARE REVIEWED. IN COMPARISON WITH THESE METHODS OF ANALYZING RADAR DATA, THE DIRECTIONAL ANTENNA MAKES IT POSSIBLE TO OBTAIN THE POSITION OF A REFLECTOR BY MEASURING IN A SINGLE BOREHOLE. THE ANTENNA HAS BEEN SUCCESSFULLY TESTED IN THE STRIPA MINE IN CONNECTION WITH THE CHARACTERIZATION AND VALIDATION PROGRAM PRESENTLY IN PROGRESS. FROM THE MEASURED SIGNALS THE ANTENNA SYNTHESIZES THE DIRECTIONAL FIELD IN AN ARBITRARY DIRECTION AS WELL AS AN ELECTRIC DIPOLE FIELD WHICH CAN BE USED FOR PHASE COMPARISON. (LONGER ABSTRACT AVAILABLE) (ORIGINAL ARTICLE NOT AVAILABLE FROM T.U.)

## 12/15 TULSA - ©TULS

**TI** - METHOD FOR DETERMINING THE POSITION OF A SUBTERRANEAN REFLECTOR FROM A TRAVELTIME CURVE

**SO** - US 4,706,223, C 87.11.10, F 86.08.01 (APPL 891,832) (11 PP; 13 CLAIMS)

**AB** - A METHOD IS DESCRIBED FOR DETERMINING THE POSITION OF A SUBTERRANEAN PLANE REFLECTOR RELATIVE TO A KNOWN

LOCATION ON THE EARTH SURFACE FROM UNPROCESSED SEISMIC DATA RECEIVED AT A NUMBER OF COLINEAR ACOUSTIC RECEIVER LOCATIONS. A TRAVELTIME CURVE ASSOCIATED WITH THE REFLECTOR IS IDENTIFIED FROM THE SEISMIC DATA. FROM 2 POINTS ON THE TRAVELTIME CURVE, A SIGNAL INDICATIVE OF THE REFLECTOR'S DIP ANGLE IS GENERATED. USING THE DIP ANGLE SIGNAL, SIGNALS INDICATIVE OF THE POSITION OF EACH IMAGED POINT OF THE REFLECTOR ARE GENERATED. THE METHOD ASSUMES KNOWLEDGE OF THE AVERAGE VELOCITY DOWN TO THE REFLECTOR. THE METHOD MAY BE APPLIED TO PROCESS RAW DATA GENERATED DURING A VERTICAL SEISMIC PROFILING OPERATION.

---

13 / 15 TULSA - ©TULS

**TI** - NEW METHODS FOR LOCATING THE MOVING GAS/WATER BOUNDARY IN UNDERGROUND STORAGE RESERVOIRS

**SO** - 58TH ANNU SPE OF AIME TECH CONF (SAN FRANCISCO, 83.10.05-08) PREPRINT NO SPE-12077, 8 PP, 1983

**AB** - METHODS HAVE BEEN DEVELOPED WHICH PERMIT THE CALCULATION OF THE APPROXIMATE POSITION OF THE MOVING GAS-WATER BOUNDARY IN UNDERGROUND GAS STORAGE RESERVOIRS FROM DATA ON STORAGE PRESSURES AND DISTANT OBSERVATION WELL LIQUID LEVELS. LOCATING THE GAS-WATER BOUNDARY IN UNDERGROUND STORAGE IS IMPORTANT IN THE CONTROL OF GAS BUBBLE GROWTH AND IN MONITORING AGAINST POSSIBLE MIGRATION AWAY FROM STORAGE HORIZON. THE MATHEMATIC PROCEDURES DEVELOPED PERMIT CALCULATION OF GAS-WATER INTERFACE LOCATION AS A FUNCTION OF TIME AS IT MOVES LATERALLY IN RESPONSE TO STORAGE OPERATIONS. REASONABLE RESULTS AND AGREEMENT WITH OBSERVATIONS WERE OBTAINED FROM THE MODEL USING RESERVOIR DATA FROM A LARGE STORAGE FIELD. THE SENSITIVITY OF RESULTS TO POSSIBLE ERRORS IN THE RESERVOIR DATA AND THE EFFECT OF LOCATION OF THE AVAILABLE KEY STORAGE WELL ARE SHOWN TO PROVIDE PRACTICAL GUIDELINES DEFINING LIMITATIONS OF THE MATHEMATIC TECHNIQUE.

14 / 15 TULSA - ©TULS

**TI** - METHOD OF INJECTIVITY PROFILE LOGGING FOR TWO PHASE FLOW

**SO** - U S 4,228,855, C 80.10.21, F 79.06.22 (APPL 51,074); TEXACO INC

**AB** - FLUID INJECTIVITY WITHIN AN INTERVAL IN A WELL BORE IS DETERMINED BY INJECTING INTO THE WELL 2 FLUID STREAMS, ONE OF WHICH FLOWS DOWN THE TUBING AND ONE OF WHICH FLOWS DOWN THE ANNULUS. ONE OF THE FLUID STREAMS CONTAINS A RADIOACTIVE TRACER. THE SUM OF THE 2 FLUID FLOW RATES IS HELD CONSTANT WHILE EACH FLOW RATE IS VARIED AGAINST THE OTHER. AT EACH DIFFERENT PAIR OF FLOW RATES, A STABLE INTERFACE IS FORMED BETWEEN THE FLUID CONTAINING THE

RADIOACTIVE TRACER AND THE FLUID WITHOUT IT. THE POSITION OF THIS STABLE INTERFACE AT EACH DIFFERENT SET OF FLUID FLOW RATES IS MEASURED BY A CONVENTIONAL GAMMA RAY WELL LOGGING TOOL, AND FROM THE SERIES OF SUCH MEASUREMENTS AN INJECTIVITY LOG OVER THE MEASURED INTERVAL CAN BE DETERMINED. THE INJECTIVITY PROFILES FOR THE 2 COMPONENTS OF A 2-PHASE FLUID FLOW SYSTEM ARE DETERMINED BY CONDUCTING THE SURVEY WITH A RADIOACTIVE TRACER SOLUBLE IN THE GAS PHASE AND REPEATING THE SURVEY WITH A RADIOACTIVE TRACER SOLUBLE IN THE LIQUID PHASE. (11 CLAIMS)

15 / 15 TULSA - ©TULS

**TI** - PROCESS FOR DETERMINING THE POSITION OF AN INTERFACE  
SEPARATING TWO LIQUIDS, ESPECIALLY IN A WELL

**SO** - FR 2,041,957, C 71.02.05, F 69.05.30; GAZ DE FRANCE (IN FRENCH)

## Search statement 16

Query/Command : st

Session finished: 19 MAY 2005 Time 14:57:36

## Subaccount MIGRATION

TULSA - Time in minutes : 17,05  
The cost estimation below is based on Questel's  
standard price list

Records displayed and billed	Estimated cost :	22.45 USD
Cost estimated for the last database search	Estimated cost :	22.68 USD
Estimated total session cost	Estimated cost :	45.51 USD

### Main Account

The cost estimation below is based on Questel's standard price list

Estimated total session cost : 0.55 USD

### Main Account and All Subaccounts

The cost estimation below is based on Questel's standard price list.

Estimated total session cost : 46.06 US\$

Your session will be retained for 2 hours.

QUESTEL.ORBIT thanks you. Hope to hear from you again soon.